**AMENDMENTS TO THE CLAIMS:**

Please replace the claims with the claims provided in the listing below wherein status, amendments, additions and cancellations are indicated.

Claims 1. - 8. - (Cancelled)

Claim 9. (New) A miniaturized temperature-zone flow reactor, for use in thermally controlled biochemical and molecular-biological processes, said reactor comprising:

at least one closed, multifold, winding flow path, each comprising a plurality of microstructured channels and at least three partial paths, in a planar substrate;

three substrate chips, made from a material having a thermal conductivity at least as high as that of silicon;

each one of said three substrate chip having at least one face, of which at least a portion thereof contains some of said plurality of microstructured channels;

heating elements, on each of said three substrate chips, for providing heating to at least that portion of each said substrate chip containing some of said plurality of microstructured channels;

a first one of said substrate chips having a plurality of inlets thereon, corresponding in number to a number of flow paths on said substrate chip;

a third one of said substrate chips having a plurality of outlets thereon, corresponding in number to a number of flow paths on said substrate chip;

each of said three substrate chips having n channel sections, each of said n channel sections having an inlet opening and an outlet opening, such that said inlet opening and said outlet opening of each said channel are linearly positioned adjacent to one another on one side of a section of each said substrate chip;

a connecting chip, having a thermal conductivity that is lower than the thermal conductivity of said substrate chips, and is at least as low as that of pyrex glass;

said connecting chip further having:

a first face, opposite to said heating elements, on which said first substrate chip and said third substrate chip are positioned, said first substrate chip and said third substrate chip being spaced apart from one another on said first face of said connecting chip;

a plurality of first passage openings on its said first face, each said first passage opening leading to a corresponding passage extending through said connecting chip;

a plurality of second passage openings, corresponding in total number to a total number of said plurality of first passage openings, in a second, opposite face of said connecting chip, such that each said second passage

opening is in fluid transporting communication with a corresponding one of said passages; and

still further such that:

said inlet openings and said outlet openings of said first substrate chip and said third substrate chip are in fluid transporting communication with said first passage openings; and

said second passage openings of said connecting chip are connected to one another by some of said microstructured channels in a second one of said three substrate chips, to form said partial paths on said second substrate chip, such that one closed flow path, having n passages through said three substrate chips is formed.

Claim 10. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein return channels of said partial paths of said second substrate chip have a reduced cross-section for fluid flow relative to other ones of said n channels, such that a fluid flow velocity through said return channels is at least three times a fluid flow velocity through said other ones of said n channels.

Claim 11. (New) The miniaturized temperature-zone flow reactor according to claim 10, wherein said return channels comprise a thermally insulating lining, which insulates said return channels relative to said second substrate chip.

Claim 12. (New) The miniaturized temperature-zone flow reactor according to claim 11, wherein said thermally insulating lining is a polymer.

Claim 13. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein said connecting chip is made of an optically transparent material.

Claim 14. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein said first substrate chip has a first inlet path, and said third substrate chip has a last outlet path, both of which paths are longer than other n partial channels on the substrate chips.

Claim 15. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein said microstructured channels and said partial paths of said at least one closed, multifold, winding flow path of said miniaturized temperature-zone flow reactor are sufficiently large to accommodate a volume of reactants fed to the reactor

that are mixed together with a volume of a carrier that is chemically non-miscible with the reactants, for transport through the reactor.

Claim 16. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein said second substrate chip has a second surface, facing away from said connecting chip, which second surface is in heat-conductive communication with a cooling element, distributed over an entirety of said second surface of said second substrate chip, for cooling said second substrate chip to a temperature lower than a temperature of said first and third substrate chips.

Claim 17. (New) The miniaturized temperature-zone flow reactor according to claim 15, wherein said carrier is oil.

Claim 18. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein said three substrate chips are made from silicon.

Claim 19. (New) The miniaturized temperature-zone flow reactor according to claim 9, wherein said connecting chip is made from pyrex glass.